

STIC Search Report **EIC 1700**

STIC Database Tracking Number: 196372

**TO: Laura Weiner
Location: REM 6C83
Art Unit : 1745
July 26, 2006**

Case Serial Number: 10/647541

**From: Kathleen Fuller
Location: EIC 1700
REMSSEN 4B28
Phone: 571/272-2505
Kathleen.Fuller@uspto.gov**

Search Notes

BROAD SEARCH COVERING FORMULAS 1-8 AND ELECTROLYTE OR FORMULAS 1-8 AND FORMULA 9 AND ELECTROLYTE. ONLY 9 CA REFERENCES.

=> file reg

FILE 'REGISTRY' ENTERED AT 15:19:14 ON 26 JUL 2006
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STRUCTURE FILE UPDATES: 25 JUL 2006 HIGHEST RN 895581-37-0
DICTIONARY FILE UPDATES: 25 JUL 2006 HIGHEST RN 895581-37-0

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TSCA INFORMATION NOW CURRENT THROUGH January 6, 2006

Please note that search-term pricing does apply when
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REGISTRY includes numerically searchable data for experimental and
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experimental property data in the original document. For information
on property searching in REGISTRY, refer to:

<http://www.cas.org/ONLINE/UG/regprops.html>

=> file hcapl

FILE 'HCAPLUS' ENTERED AT 15:19:18 ON 26 JUL 2006
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FILE COVERS 1907 - 26 Jul 2006 VOL 145 ISS 5
FILE LAST UPDATED: 25 Jul 2006 (20060725/ED)

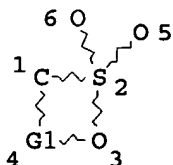
New CAS Information Use Policies, enter HELP USAGETERMS for details.

This file contains CAS Registry Numbers for easy and accurate
substance identification.

=> d que

L3

STR



*query covers all claims
1165 structures*

REP G1=(1-10) A

NODE ATTRIBUTES:

CONNECT IS E1 RC AT 5

CONNECT IS E1 RC AT 6

DEFAULT MLEVEL IS ATOM

DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:

RSPEC I

NUMBER OF NODES IS 6

STEREO ATTRIBUTES: NONE

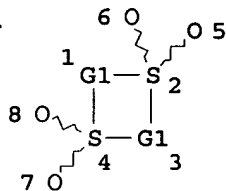
L5 1165 SEA FILE=REGISTRY SSS FUL L3

L6 947 SEA FILE=REGISTRY ABB=ON L5 AND 1/S

L7 883 SEA FILE=REGISTRY ABB=ON L6 NOT M/ELS

L9 218 SEA FILE=REGISTRY ABB=ON L5 NOT L6

L12 STR



883 structures per claim 9-11 with one S=O
Subset search for broad claim covering 2 S=O in ring
121 structures

REP G1=(1-5) A

NODE ATTRIBUTES:

CONNECT IS E1 RC AT 5

CONNECT IS E1 RC AT 6

CONNECT IS E1 RC AT 7

CONNECT IS E1 RC AT 8

DEFAULT MLEVEL IS ATOM

DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:

RSPEC I

NUMBER OF NODES IS 8

STEREO ATTRIBUTES: NONE

L17 121 SEA FILE=REGISTRY SUB=L5 SSS FUL L12

L18 114 SEA FILE=REGISTRY ABB=ON L17 NOT M/ELS

L19 205 SEA FILE=HCAPLUS ABB=ON L9

L20 7 SEA FILE=HCAPLUS ABB=ON L19 (L) ELECTROLYTE?

L21 134 SEA FILE=HCAPLUS ABB=ON L18

L22 7 SEA FILE=HCAPLUS ABB=ON L21 (L) ELECTROLYTE?

L23 2653 SEA FILE=HCAPLUS ABB=ON L7

L24 59 SEA FILE=HCAPLUS ABB=ON L19 AND L23

L25 5 SEA FILE=HCAPLUS ABB=ON L24 AND ELECTROLYTE?

L26 8 SEA FILE=HCAPLUS ABB=ON L20 OR L22 OR L25

L27 9 SEA FILE=HCAPLUS ABB=ON (L19 OR L21) AND ELECTROLYTE?

L28 9 SEA FILE=HCAPLUS ABB=ON L27 OR L26

Claims formulas 1-8 and 9

Only 9 CA references for claim formulas 1-8 and electrolyte or 1-8 and 9 and electrolyte

=> d 128 1-9 bib abs ind hitstr

L28 ANSWER 1 OF 9 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2005:888332 HCAPLUS

DN 143:250968

TI **Electrolyte** solutions containing cyclic sulfonate esters and secondary batteries using them

IN Kusachi, Yuki; Utsuki, Koji; Hasegawa, Etsuo

PA NEC Corp., Japan

SO Jpn. Kokai Tokkyo Koho, 23 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|---------------|------|----------|-----------------|----------|
| PI | JP 2005228631 | A2 | 20050825 | JP 2004-37003 | 20040213 |
| PRAI | JP 2004-37003 | | 20040213 | | |

OS MARPAT 143:250968

AB The **electrolyte** solns. contain aprotic solvents and cyclic sulfonate esters with up to 10 sulfonate groups linked by C1-5 alkylene or fluoroalkylene groups. The solns. stabilize solid **electrolyte** interphase (SEI) films, resulting in batteries, e.g., secondary Li batteries, showing a long charge-discharge cycle life.

IC ICM H01M010-40

ICS H01M004-02; H01M004-38; H01M004-58

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST cyclic sulfonate ester electrolytic soln lithium battery

IT Carboxylic acids, uses

RL: DEV (Device component use); USES (Uses)

(aliphatic, esters; electrolytic solns. containing aprotic solvents and cyclic

sulfonate esters for secondary batteries)

IT Sulfonic acids, uses

RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)

(alkanesulfonic, anhydrides; electrolytic solns. containing aprotic solvents and cyclic sulfonate esters for secondary batteries)

IT Sulfonic acids, uses

RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)

(cyclic sulfonic acid esters; electrolytic solns. containing aprotic solvents and cyclic sulfonate esters for secondary batteries)

IT Ethers, uses

RL: DEV (Device component use); USES (Uses)

(cyclic; electrolytic solns. containing aprotic solvents and cyclic sulfonate esters for secondary batteries)

IT Battery anodes

Battery cathodes

Battery **electrolytes**

Electrolytic solutions

(electrolytic solns. containing aprotic solvents and cyclic sulfonate esters for secondary batteries)

IT Carbonates, uses

Ethers, uses

RL: DEV (Device component use); USES (Uses)

(electrolytic solns. containing aprotic solvents and cyclic sulfonate esters for secondary batteries)

IT Secondary batteries

(lithium; electrolytic solns. containing aprotic solvents and cyclic sulfonate esters for secondary batteries)

IT Lactones

RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)

(sultones, γ -; electrolytic solns. containing aprotic solvents and

cyclic sulfonate esters for secondary batteries)

IT Lactones
RL: DEV (Device component use); USES (Uses)
(γ -; electrolytic solns. containing aprotic solvents and cyclic sulfonate esters for secondary batteries)

IT 7440-44-0, Carbon, uses
RL: DEV (Device component use); USES (Uses)
(amorphous, anode active mass; electrolytic solns. containing aprotic solvents and cyclic sulfonate esters for secondary batteries)

IT 7439-93-2, Lithium, uses 7782-42-5, Graphite, uses
RL: DEV (Device component use); USES (Uses)
(anode active mass; electrolytic solns. containing aprotic solvents and cyclic sulfonate esters for secondary batteries)

IT 12057-17-9, Lithium manganese oxide (LiMn_2O_4) 508200-28-0, Lithium manganese nickel titanium oxide ($\text{LiMn}_{1.35}\text{Ni}_{0.5}\text{Ti}_{0.15}\text{O}_4$)
RL: DEV (Device component use); USES (Uses)
(cathode active mass; electrolytic solns. containing aprotic solvents and cyclic sulfonate esters for secondary batteries)

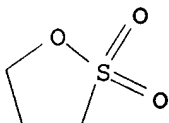
IT 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 108-32-7, Propylene carbonate 872-36-6, Vinylene carbonate 3145-91-3, Lithium tetrachloroaurate 7791-03-9, Lithium perchlorate 14283-07-9, Lithium tetrafluoroborate 18424-17-4, Lithium hexafluoroantimonate 21324-40-3, Lithium hexafluorophosphate 29935-35-1, Lithium hexafluoroarsenate
RL: DEV (Device component use); USES (Uses)
(electrolytic solns. containing aprotic solvents and cyclic sulfonate esters for secondary batteries)

IT 126-33-0, Sulfolane 1120-71-4, 1,3-Propanesultone 1633-83-6, 1,4-Butanesultone 28452-93-9D, Sulfolene, derivs. 863198-22-5 863198-23-6 863198-24-7
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(electrolytic solns. containing aprotic solvents and cyclic sulfonate esters for secondary batteries)

IT 1120-71-4, 1,3-Propanesultone 1633-83-6, 1,4-Butanesultone 863198-22-5 863198-23-6 863198-24-7
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(electrolytic solns. containing aprotic solvents and cyclic sulfonate esters for secondary batteries)

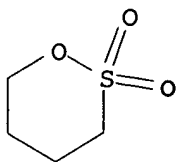
RN 1120-71-4 HCAPLUS

CN 1,2-Oxathiolane, 2,2-dioxide (8CI, 9CI) (CA INDEX NAME)



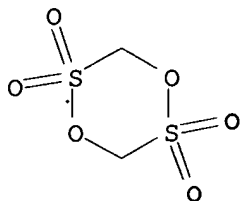
RN 1633-83-6 HCAPLUS

CN 1,2-Oxathiane, 2,2-dioxide (8CI, 9CI) (CA INDEX NAME)



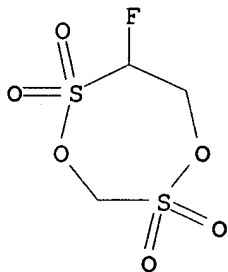
RN 863198-22-5 HCAPLUS

CN 1,4,2,5-Dioxadithiane, 2,2,5,5-tetraoxide (9CI) (CA INDEX NAME)



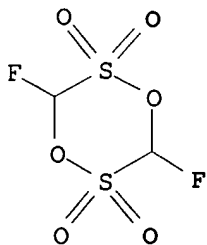
RN 863198-23-6 HCAPLUS

CN 1,4,2,5-Dioxadithiepane, 6-fluoro-, 2,2,5,5-tetraoxide (9CI) (CA INDEX NAME)



RN 863198-24-7 HCAPLUS

CN 1,4,2,5-Dioxadithiane, 3,6-difluoro-, 2,2,5,5-tetraoxide (9CI) (CA INDEX NAME)



L28 ANSWER 2 OF 9 HCAPLUS COPYRIGHT 2006 ACS on STN

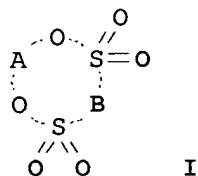
AN 2005:822793 HCAPLUS

DN 143:232664

TI **Electrolytes** for secondary lithium batteries, and same batteries

IN Utsuki, Koji; Kusachi, Yuki
 PA NEC Corp., Japan
 SO Jpn. Kokai Tokkyo Koho, 24 pp.
 CODEN: JKXXAF
 DT Patent
 LA Japanese
 FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|-------------------|------|----------|-----------------|----------|
| | ----- | --- | ----- | ----- | ----- |
| PI | JP 2005222846 | A2 | 20050818 | JP 2004-30661 | 20040206 |
| PRAI | JP 2004-30661 | | 20040206 | | |
| OS | MARPAT 143:232664 | | | | |
| GI | | | | | |



- AB The **electrolytes** contain nonprotonic solvents and 0.1-5.0 weight% of cyclic disulfonic acid esters, and the content of chlorine in the **electrolytes** is suppressed to <150 ppm. Preferably, the esters are expressed by I [A = (branched) (substituted) C1-5 alkylene, carbonyl, sulfinyl, (branched) perfluoroalkylene, etc.; B = (branched) (substituted) alkylene]. The esters provide protective films on electrode so as to prevent the electrodes from reaction with **electrolyte** solvents, so that secondary lithium batteries employing the **electrolytes** show high storage stability, and excellent charge-discharge cycling performance.
- IC ICM H01M010-40
 ICS H01M004-02; H01M004-38; H01M004-48; H01M004-58
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 28
- ST lithium battery **electrolyte** cyclic disulfonic acid ester;
 alkylenedisulfonic acid cyclic ester battery **electrolyte**
- IT Carbonates, uses
 Ethers, uses
 RL: DEV (Device component use); USES (Uses)
 (**electrolyte** components; lithium secondary battery **electrolytes** containing cyclic disulfonic acid esters)
- IT Carboxylic acids, uses
 RL: DEV (Device component use); USES (Uses)
 (esters, aliphatic, **electrolyte** components; lithium secondary battery **electrolytes** containing cyclic disulfonic acid esters)
- IT Battery **electrolytes**
 (lithium secondary battery **electrolytes** containing cyclic disulfonic acid esters)
- IT Secondary batteries
 (lithium; lithium secondary battery **electrolytes** containing cyclic disulfonic acid esters)
- IT Lactones
 RL: DEV (Device component use); USES (Uses)
 (γ-, aliphatic, **electrolyte** components; lithium secondary battery **electrolytes** containing cyclic disulfonic acid esters)
- IT 7791-03-9, Lithium perchlorate 14024-11-4, Aluminum lithium chloride

(AlLiCl₄) 14283-07-9, Lithium tetrafluoroborate 18424-17-4, Lithium hexafluoroantimonate 21324-40-3, Lithium hexafluorophosphate 29935-35-1, Lithium hexafluoroarsenate

RL: DEV (Device component use); USES (Uses)

(electrolyte components; lithium secondary battery electrolytes containing cyclic disulfonic acid esters)

IT 99591-73-8P 99591-74-9P

RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)

(electrolyte components; lithium secondary battery electrolytes containing cyclic disulfonic acid esters)

IT 5799-68-8P, Methanedisulfonyl dichloride 71608-87-2P

RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)

(in preparation of cyclic disulfonic acid esters for lithium secondary battery electrolytes)

IT 75-11-6, Diiodomethane 107-21-1, Ethylene glycol, reactions 534-16-7, Silver carbonate 7790-94-5, Chlorosulfonic acid 10025-87-3, Phosphorus oxychloride

RL: RCT (Reactant); RACT (Reactant or reagent)

(in preparation of cyclic disulfonic acid esters for lithium secondary battery electrolytes)

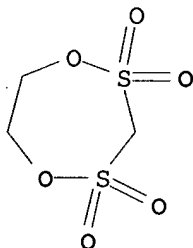
IT 99591-73-8P 99591-74-9P

RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)

(electrolyte components; lithium secondary battery electrolytes containing cyclic disulfonic acid esters)

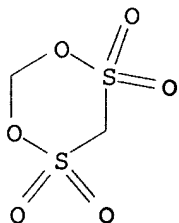
RN 99591-73-8 HCAPLUS

CN 1,5,2,4-Dioxadithiepane, 2,2,4,4-tetraoxide (9CI) (CA INDEX NAME)



RN 99591-74-9 HCAPLUS

CN 1,5,2,4-Dioxadithiane, 2,2,4,4-tetraoxide (9CI) (CA INDEX NAME)



L28 ANSWER 3 OF 9 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2005:547843 HCAPLUS

DN 143:81122

TI lithium secondary battery
 IN Miyachi, Mariko; Utsugi, Koji; Kusachi, Yuki; Yamamoto, Hironori
 PA NEC Corporation, Japan
 SO PCT Int. Appl., 95 pp.
 CODEN: PIXXD2
 DT Patent
 LA Japanese
 FAN.CNT 3

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|---|------|----------|-----------------|----------|
| PI | WO 2005057715 | A1 | 20050623 | WO 2004-JP18715 | 20041215 |
| | W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW | | | | |
| | RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG | | | | |
| | JP 2005203341 | A2 | 20050728 | JP 2004-317279 | 20041029 |
| | JP 2005203342 | A2 | 20050728 | JP 2004-317281 | 20041029 |
| | JP 2005203343 | A2 | 20050728 | JP 2004-317297 | 20041029 |
| | JP 2006156314 | A2 | 20060615 | JP 2004-363498 | 20041215 |
| | JP 2006156315 | A2 | 20060615 | JP 2004-363502 | 20041215 |
| PRAI | JP 2003-416516 | A | 20031215 | | |
| | JP 2004-317280 | A | 20041029 | | |
| | JP 2004-317298 | A | 20041029 | | |
| | JP 2004-317278 | A | 20041029 | | |
| | JP 2004-317299 | A | 20041029 | | |
| OS | MARPAT 143:81122 | | | | |
| AB | The present invention aims to provide a lithium secondary battery with excellent characteristics such as energy d. and electromotive force, which is also excellent in cycle life and shelf life stability. Disclosed is a secondary battery comprising at least a pos. electrode, a neg. electrode and an electrolyte solution wherein the neg. electrode contains a metal, metalloid or oxide, which adsorbs/desorbs an alkali metal or alkaline earth metal, and a carbon material as the neg. electrode active material, and the electrolyte solution contains a non-protonic solvent wherein at least an electrolyte is dissolved and a chain disulfone compound | | | | |
| IC | ICM H01M010-40 | | | | |
| | ICS H01M004-02; H01M004-38; H01M004-48; H01M004-58 | | | | |
| CC | 52-2 (Electrochemical, Radiational, and Thermal Energy Technology) | | | | |
| ST | lithium secondary battery anode active substance electrolyte additive disulfone | | | | |
| IT | Battery anodes (anode active substances for) | | | | |
| IT | Secondary batteries (lithium; additives for) | | | | |
| IT | Battery electrolytes (nonaq.; disulfone additives for) | | | | |
| IT | 872-36-6, Vinylene carbonate 1120-71-4, Propane sultone 2997-54-8 6330-39-8 22063-27-0 22063-28-1 23601-06-1 99591-74-9 152949-20-7 500878-47-7 855472-38-7 855472-43-4 855472-46-7 | | | | |
| | RL: MOA (Modifier or additive use); USES (Uses) | | | | |

(additives for lithium non-aqueous electrolyte solution)

IT 1303-86-2, Boron oxide (B₂O₃), uses 1309-37-1, Ferric oxide, uses 1314-56-3, Phosphorus oxide (P₂O₅), uses 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7439-92-1, Lead, uses 7440-02-0, Nickel, uses 7440-21-3, Silicon, uses 7440-22-4, Silver, uses 7440-31-5, Tin, uses 7440-32-6, Titanium, uses 7440-36-0, Antimony, uses 7440-50-8, Copper, uses 7440-56-4, Germanium, uses 7782-42-5, Graphite, uses 12023-55-1, Iron silicide (Fe₃Si₇) 12031-95-7, Lithium titanium oxide (Li₄Ti₅O₁₂) 12036-84-9, Tungsten oxide (W₂O₅) 12042-55-6, Aluminum silicide (AlSi) 12334-14-4, Tin silicide (SnSi) 18282-10-5, Tin dioxide 21651-19-4, Tin monoxide 39445-33-5 53095-76-4, Lithium silicide (LiSi) 113443-18-8, Silicon oxide (SiO) 160479-36-7, Lithium tin oxide 178958-56-0, Lithium silicon oxide 855472-17-2, Iron silicide (FeSi₁₉) 855472-21-8, Aluminum nickel silicide (Al₉NiSi₁₀) 855472-26-3, Tin titanium silicide (SnTi₁₈Si) 855475-31-9

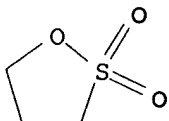
RL: TEM (Technical or engineered material use); USES (Uses)
(anode active substance for lithium secondary batteries)

IT 1120-71-4, Propane sultone 99591-74-9

RL: MOA (Modifier or additive use); USES (Uses)
(additives for lithium non-aqueous electrolyte solution)

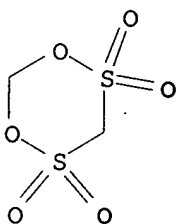
RN 1120-71-4 HCAPLUS

CN 1,2-Oxathiolane, 2,2-dioxide (8CI, 9CI) (CA INDEX NAME)



RN 99591-74-9 HCAPLUS

CN 1,5,2,4-Dioxadithiane, 2,2,4,4-tetraoxide (9CI) (CA INDEX NAME)



RE.CNT 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L28 ANSWER 4 OF 9 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2005:547842 HCAPLUS

DN 143:81121

TI **Electrolyte** solution for secondary lithium battery and the battery

IN Utsugi, Koji; Kusachi, Yuki; Katou, Tsuyoshi

PA NEC Corporation, Japan

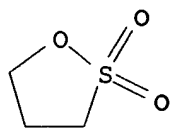
SO PCT Int. Appl., 55 pp.
CODEN: PIXXD2

DT Patent

LA Japanese

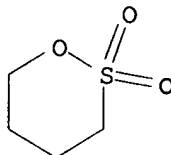
FAN.CNT 3

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|---|------|----------|------------------|----------|
| PI | WO 2005057714 | A1 | 20050623 | WO 2004-JP18698 | 20041215 |
| | W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW | | | | |
| | RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG | | | | |
| | JP 2005203341 | A2 | 20050728 | JP 2004-317279 | 20041029 |
| | JP 2005203342 | A2 | 20050728 | JP 2004-317281 | 20041029 |
| | JP 2005203343 | A2 | 20050728 | JP 2004-317297 | 20041029 |
| | CN 1757134 | A | 20060405 | CN 2004-80005513 | 20041215 |
| | JP 2006156314 | A2 | 20060615 | JP 2004-363498 | 20041215 |
| | JP 2006156315 | A2 | 20060615 | JP 2004-363502 | 20041215 |
| PRAI | JP 2003-416516 | A | 20031215 | | |
| | JP 2004-317301 | A | 20041029 | | |
| | JP 2004-317278 | A | 20041029 | | |
| | JP 2004-317299 | A | 20041029 | | |
| OS | MARPAT 143:81121 | | | | |
| AB | The electrolyte solution has an electrolyte dissolved in an aprotic solvent and contains a disulfone R3-SO2-CR1R4-SO2-R2, where R1-4 are various hydrocarbon groups which may also contain F, O, S, and N. | | | | |
| IC | ICM H01M010-40 ICS H01M004-02; H01M004-38; H01M004-58; H01G009-038; H01L031-04; H01M014-00 | | | | |
| CC | 52-2 (Electrochemical, Radiational, and Thermal Energy Technology) | | | | |
| ST | secondary lithium battery electrolyte disulfone additive | | | | |
| IT | Battery electrolytes (electrolyte solns. containing disulfone additives for secondary lithium batteries) | | | | |
| IT | 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 108-32-7, Propylene carbonate 21324-40-3, Lithium hexafluorophosphate RL: DEV (Device component use); USES (Uses) (electrolyte solns. containing disulfone additives for secondary lithium batteries) | | | | |
| IT | 872-36-6, Vinylene carbonate 1120-71-4, 1,3-Propanesultone 1633-83-6, 1,4-Butanesultone 2997-54-8 6330-39-8 22063-27-0 22063-28-1 23601-06-1 99591-74-9 152949-20-7 500878-47-7 855472-38-7 855472-43-4 855472-46-7 RL: MOA (Modifier or additive use); USES (Uses) (electrolyte solns. containing disulfone additives for secondary lithium batteries) | | | | |
| IT | 1120-71-4, 1,3-Propanesultone 1633-83-6, 1,4-Butanesultone 99591-74-9 RL: MOA (Modifier or additive use); USES (Uses) (electrolyte solns. containing disulfone additives for secondary lithium batteries) | | | | |
| RN | 1120-71-4 HCAPLUS | | | | |
| CN | 1,2-Oxathiolane, 2,2-dioxide (8CI, 9CI) (CA INDEX NAME) | | | | |



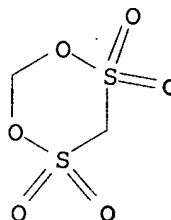
RN 1633-83-6 HCAPLUS

CN 1,2-Oxathiane, 2,2-dioxide (8CI, 9CI) (CA INDEX NAME)



RN 99591-74-9 HCAPLUS

CN 1,5,2,4-Dioxadithiane, 2,2,4,4-tetraoxide (9CI) (CA INDEX NAME)



RE.CNT 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L28 ANSWER 5 OF 9 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2005:283747 HCAPLUS

DN 142:358030

TI Secondary nonaqueous electrolyte battery

IN Kusachi, Yuki; Utsugi, Koji

PA NEC Corporation, Japan

SO PCT Int. Appl., 34 pp.

CODEN: PIXXD2

DT Patent

LA Japanese

FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|-----|--|------|----------|-----------------|----------|
| PI | WO 2005029613 | A1 | 20050331 | WO 2004-JP11534 | 20040811 |
| W: | AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW | | | | |
| RW: | BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, | | | | |

SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE,
SN, TD, TG

PRAI JP 2003-322968 A 20030916

AB The battery has an anode whose surface is provided with a substance having a peak at 162.9-164.0 eV according to XPS anal.

IC ICM H01M004-02

ICS H01M010-40; H01M004-38; H01M004-58

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST secondary battery anode surface electrolyte deposition XPS characteristic; battery electrolyte org sulfur contg compd

IT Battery anodes

Battery electrolytes

(electrolytes having organic S containing compds. for secondary lithium batteries)

IT Secondary batteries

(lithium; electrolytes having organic S containing compds. for secondary lithium batteries)

IT 7440-44-0, Carbon, uses

RL: DEV (Device component use); USES (Uses)

(amorphous; electrolytes having organic S containing compds. for secondary lithium batteries)

IT 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 108-32-7, Propylene carbonate 12057-17-9, Lithium manganese oxide (LiMn2O4) 21324-40-3, Lithium hexafluorophosphate 99591-73-8 99591-74-9

RL: DEV (Device component use); USES (Uses)

(electrolytes having organic S containing compds. for secondary lithium batteries)

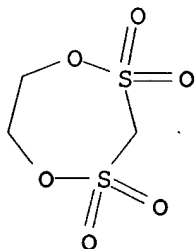
IT 99591-73-8 99591-74-9

RL: DEV (Device component use); USES (Uses)

(electrolytes having organic S containing compds. for secondary lithium batteries)

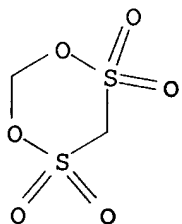
RN 99591-73-8 HCAPLUS

CN 1,5,2,4-Dioxadithiepane, 2,2,4,4-tetraoxide (9CI) (CA INDEX NAME)



RN 99591-74-9 HCAPLUS

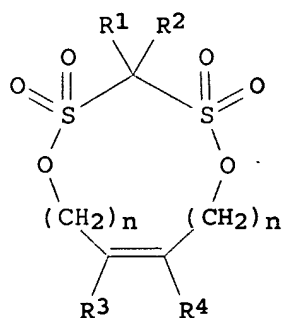
CN 1,5,2,4-Dioxadithiane, 2,2,4,4-tetraoxide (9CI) (CA INDEX NAME)



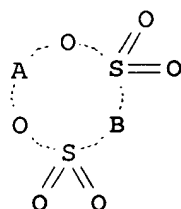
RE.CNT 17 THERE ARE 17 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L28 ANSWER 6 OF 9 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2004:823614 HCAPLUS
DN 141:334876
TI **Electrolyte** solution for secondary battery and the battery
IN Kusachi, Yuki; Utsuki, Koji
PA NEC Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 27 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

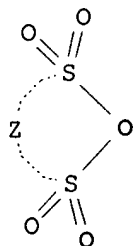
| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|-------------------|------|----------|-----------------|----------|
| PI | JP-2004281325 | A2 | 20041007 | JP 2003-74054 | 20030318 |
| PRAI | JP 2003-74054 | | 20030318 | | |
| OS | MARPAT 141:334876 | | | | |
| GI | | | | | |



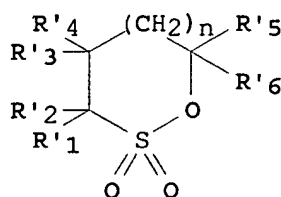
I



II



III

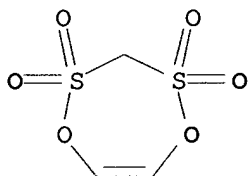


IV

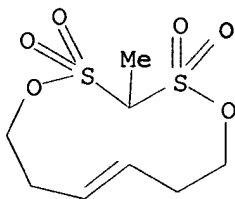
AB The **electrolyte** solution contains an aprotic solvent and an unsatd. cyclic disulfonate ester I, where R1-R4 = H, Me, Et, or halogen and n = integer 0-2. The **electrolyte** solution may also contain II [A = (substituted) C1-5 (fluoro)alkylene, carbonyl, sulfinyl, or bivalent C2-6 group containing ether bond connected (fluoro)alkylene units; B = (substituted) alkylene group], III [Z = (substituted) C2-4 alkylene, alkenylene, aromatic or heterocyclic group], or IV (n = integer 0-2, R'1-R'6 = H C1-12 alkyl, C3-6 cycloalkyl, or C6-12 aryl group). The battery is a secondary Li battery.

IC ICM H01M010-40
ICS H01M004-58

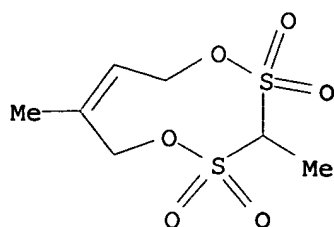
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST secondary lithium battery electrolyte soln cyclic disulfonate ester
IT Battery electrolytes
(electrolyte solns. containing cyclic disulfonate esters and other additives for secondary lithium batteries)
IT 769973-24-2 769973-25-3 769973-26-4 769973-27-5
RL: MOA (Modifier or additive use); USES (Uses)
(cyclic disulfonate ester containing secondary lithium battery electrolyte solns.)
IT 872-36-6, Vinylene carbonate 1120-71-4, 1,3-Propanesultone 14913-52-1, Neodymium ion (Nd3+), uses 18472-30-5, Erbium ion (Er3+), uses 22541-18-0, Europium ion (Eu3+), uses 22541-22-6, Holmium ion (Ho3+), uses 259194-36-0 259194-40-6 634598-36-0 634598-37-1
RL: MOA (Modifier or additive use); USES (Uses)
(electrolyte solns. containing cyclic disulfonate esters and other additives for secondary lithium batteries)
IT 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 21324-40-3, Lithium hexafluorophosphate 132843-44-8
RL: DEV (Device component use); USES (Uses)
(electrolyte solns. containing cyclic disulfonate esters for secondary lithium batteries)
IT 769973-24-2 769973-25-3 769973-26-4 769973-27-5
RL: MOA (Modifier or additive use); USES (Uses)
(cyclic disulfonate ester containing secondary lithium battery electrolyte solns.)
RN 769973-24-2 HCAPLUS
CN 1,5,2,4-Dioxadithiepin, 2,2,4,4-tetraoxide (9CI) (CA INDEX NAME)



RN 769973-25-3 HCAPLUS
CN 1,5-Dioxa-2,4-dithiacycloundec-8-ene, 3-methyl-, 2,2,4,4-tetraoxide (9CI)
(CA INDEX NAME)

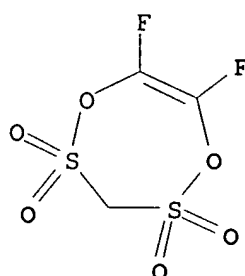


RN 769973-26-4 HCAPLUS
CN 1,5,2,4-Dioxadithionin, 6,9-dihydro-3,7-dimethyl-, 2,2,4,4-tetraoxide (9CI) (CA INDEX NAME)



RN 769973-27-5 HCAPLUS

CN 1,5,2,4-Dioxadithiepin, 6,7-difluoro-, 2,2,4,4-tetraoxide (9CI) (CA INDEX NAME)



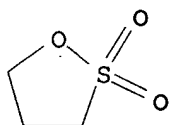
IT 1120-71-4, 1,3-Propanesultone

RL: MOA (Modifier or additive use); USES (Uses)

(electrolyte solns. containing cyclic disulfonate esters and other additives for secondary lithium batteries)

RN 1120-71-4 HCAPLUS

CN 1,2-Oxathiolane, 2,2-dioxide (8CI, 9CI) (CA INDEX NAME)



L28 ANSWER 7 OF 9 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2004:181920 HCAPLUS

DN 140:184814

TI Electrolyte solution for secondary battery

IN Utsugi, Koji; Kusachi, Yuki; Yamazaki, Ikiko

PA NEC Corporation, Japan

SO Eur. Pat. Appl., 35 pp.

CODEN: EPXXDW

DT Patent

LA English

FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|----|------------|------|----------|-----------------|----------|
| PI | EP 1394888 | A1 | 20040303 | EP 2003-90268 | 20030822 |
| | EP 1394888 | B1 | 20060412 | | |

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,

applicant

IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK

| | | | | |
|---------------|----|----------|-----------------------|----------|
| JP 2004281368 | A2 | 20041007 | JP 2003-289432 | 20030807 |
| US 2004043300 | A1 | 20040304 | <u>US 2003-647541</u> | 20030826 |
| KR 2004019994 | A | 20040306 | KR 2003-59849 | 20030828 |
| CN 1495959 | A | 20040512 | CN 2003-132755 | 20030829 |

PRAI JP 2002-250441 A 20020829
 JP 2003-52588 A 20030228
 JP 2003-289432 A 20030807

AB The present invention provides a technol. of inhibiting the decomposition of the solvent of the **electrolyte** solution for a secondary battery. Further, the present invention provides a technol. of prohibiting the resistance increase of a secondary battery and improving the storage properties such as improving the capacity retention ratio. An **electrolyte** solution comprising non-proton solvent and cyclic sulfonic ester including at least two sulfonyl groups may be used.

IC ICM H01M010-40
 ICS H01M006-16

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **electrolyte** soln secondary battery

IT Ethers, uses
 RL: DEV (Device component use); USES (Uses)
 (cyclic; **electrolyte** solution for secondary battery)

IT Battery **electrolytes**
 (**electrolyte** solution for secondary battery)

IT Ethers, uses
 Rare earth complexes
 Transition metal complexes
 RL: DEV (Device component use); USES (Uses)
 (**electrolyte** solution for secondary battery)

IT Carboxylic acids, uses
 RL: DEV (Device component use); USES (Uses)
 (esters, aliphatic; **electrolyte** solution for secondary battery)

IT Sulfonic acids, uses
 RL: DEV (Device component use); USES (Uses)
 (esters, cyclic; **electrolyte** solution for secondary battery)

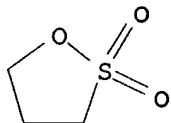
IT Secondary batteries
 (lithium; **electrolyte** solution for secondary battery)

IT Lactones
 RL: DEV (Device component use); USES (Uses)
 (γ -; **electrolyte** solution for secondary battery)

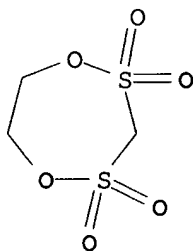
IT 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 108-32-7, Propylene carbonate 463-79-6D, Carbonic acid, ester, cyclic 463-79-6D, Carbonic acid, ester, linear 497-62-1 872-36-6, Vinylene carbonate 7429-90-5, Aluminum, uses 7439-93-2, Lithium, uses 7440-00-8D, Neodymium, complex 7440-44-0, Carbon, uses 7440-52-0D, Erbium, complex 7440-53-1D, Europium, complex 7440-60-0D, Holmium, complex 7782-42-5, Graphite, uses 7791-03-9, Lithium perchlorate 12057-17-9, Lithium manganese oxide LiMn_2O_4 14024-11-4, Lithium tetrachloroaluminate 14283-07-9, Lithium tetrafluoroborate 18424-17-4, Lithium hexafluoroantimonate 21324-40-3, Lithium hexafluorophosphate 29935-35-1, Lithium hexafluoroarsenate 113066-89-0, Cobalt lithium nickel oxide $\text{Co}_0.2\text{LiNi}_0.8\text{O}_2$ 132843-44-8
 RL: DEV (Device component use); USES (Uses)
 (**electrolyte** solution for secondary battery)

IT 1120-71-4, 1,3-Propanesultone 14913-52-1, Neodymium(3+), uses 18472-30-5, Erbium(3+), uses 22541-18-0, Europium(3+), uses 22541-22-6, Holmium(3+), uses 37181-39-8, Triflate 99591-73-8 99591-74-9 99591-80-7 259194-36-0 259194-40-6 634598-36-0 634598-37-1 659737-87-8 659737-88-9 659737-89-0 659737-90-3

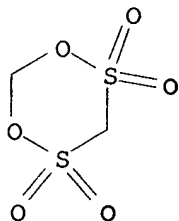
RL: MOA (Modifier or additive use); USES (Uses)
(electrolyte solution for secondary battery)
IT 1120-71-4, 1,3-Propanesultone 99591-73-8
99591-74-9 99591-80-7 659737-87-8
659737-88-9 659737-89-0 659737-90-3
RL: MOA (Modifier or additive use); USES (Uses)
(electrolyte solution for secondary battery)
RN 1120-71-4 HCAPLUS
CN 1,2-Oxathiolane, 2,2-dioxide (8CI, 9CI) (CA INDEX NAME)



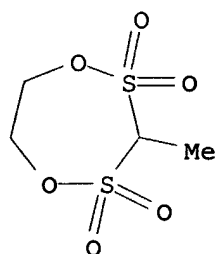
RN 99591-73-8 HCAPLUS
CN 1,5,2,4-Dioxadithiepane, 2,2,4,4-tetraoxide (9CI) (CA INDEX NAME)



RN 99591-74-9 HCAPLUS
CN 1,5,2,4-Dioxadithiane, 2,2,4,4-tetraoxide (9CI) (CA INDEX NAME)

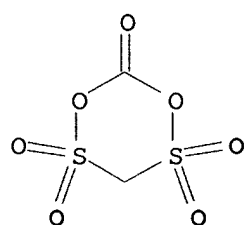


RN 99591-80-7 HCAPLUS
CN 1,5,2,4-Dioxadithiepane, 3-methyl-, 2,2,4,4-tetraoxide (9CI) (CA INDEX NAME)



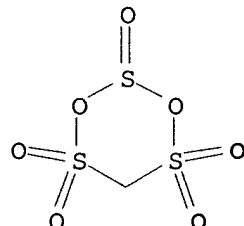
RN 659737-87-8 HCAPLUS

CN 1,5,2,4-Dioxadithian-6-one, 2,2,4,4-tetraoxide (9CI) (CA INDEX NAME)



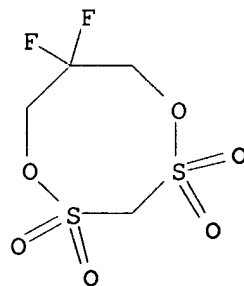
RN 659737-88-9 HCAPLUS

CN 1,3,2,4,6-Dioxatrithiane, 2,4,4,6,6-pentaoxide (9CI) (CA INDEX NAME)



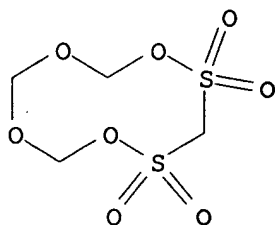
RN 659737-89-0 HCAPLUS

CN 1,5,2,4-Dioxadithiocane, 7,7-difluoro-, 2,2,4,4-tetraoxide (9CI) (CA INDEX NAME)



RN 659737-90-3 HCAPLUS

CN 1,5,7,9,2,4-Tetroxadithieane, 2,2,4,4-tetraoxide (9CI) (CA INDEX NAME)



RE.CNT 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L28 ANSWER 8 OF 9 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2004:57903 HCAPLUS

DN 140:131080

TI **Electrolyte** solution for the secondary battery and the battery
using the solution

IN Utsuki, Koji; Mori, Mitsuhiro

PA NEC Corp., Japan

SO Jpn. Kokai Tokkyo Koho, 24 pp.

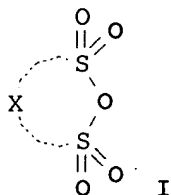
CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|----------------|------|----------|-----------------|----------|
| PI | JP 2004022336 | A2 | 20040122 | JP 2002-175648 | 20020617 |
| PRAI | JP 2002-175648 | | 20020617 | | |
| GI | | | | | |



AB The **electrolyte** solution has a sulfonic acid anhydride I [X = (substituted) C2-4 alkylene, (substituted) C2-4 alkenyl, or (substituted) aromatic ring] in an aprotic solvent. The battery has a cathode, an anode, and the above **electrolyte** solution

IC ICM H01M010-40

ICS H01M004-02; H01M004-58

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST secondary battery **electrolyte** sulfonic acid anhydride

IT Battery **electrolytes**

Secondary batteries

(**electrolyte** solns. containing sulfonic acid anhydrides for
secondary batteries)

IT 7440-44-0, Carbon, uses

RL: DEV (Device component use); USES (Uses)

(amorphous; anode; **electrolyte** solns. containing sulfonic acid
anhydrides for secondary batteries)

IT 7439-93-2, Lithium, uses 7782-42-5, Graphite, uses

RL: DEV (Device component use); USES (Uses)
(anode; electrolyte solns. containing sulfonic acid anhydrides for secondary batteries)

IT 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 108-32-7, Propylene carbonate 12057-17-9, Lithium manganese oxide (LiMn2O4) 21324-40-3, Lithium hexafluorophosphate 33356-82-0 132843-44-8

RL: DEV (Device component use); USES (Uses)
(electrolyte solns. containing sulfonic acid anhydrides for secondary batteries)

IT 872-36-6, Vinylene carbonate 4378-87-4 76076-58-9
82727-20-6 259194-36-0 259194-40-6 634598-36-0 634598-37-1
648922-25-2 648922-26-3 648922-27-4

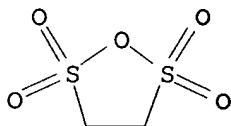
RL: MOA (Modifier or additive use); USES (Uses)
(electrolyte solns. containing sulfonic acid anhydrides for secondary batteries)

IT 4378-87-4 82727-20-6

RL: MOA (Modifier or additive use); USES (Uses)
(electrolyte solns. containing sulfonic acid anhydrides for secondary batteries)

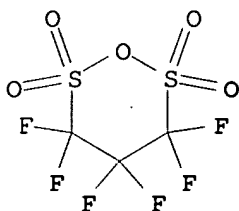
RN 4378-87-4 HCAPLUS

CN 1,2,5-Oxadithiolane, 2,2,5,5-tetraoxide (9CI) (CA INDEX NAME)



RN 82727-20-6 HCAPLUS

CN 1,2,6-Oxadithiane, 3,3,4,4,5,5-hexafluoro-, 2,2,6,6-tetraoxide (9CI) (CA INDEX NAME)



L28 ANSWER 9 OF 9 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 1990:167909 HCAPLUS

DN 112:167909

TI Bath for electrodeposition of smooth copper layers

IN Loewe, Holger; Schmidt, Helge; Kiessling, Sabine; Vieweger, Ulrich; Schmidt, Cordt; Liebscher, Heinz; Kurz, Stefan

PA Technische Hochschule Ilmenau, Ger. Dem. Rep.

SO Ger. (East), 7 pp.

CODEN: GEXXA8

DT Patent

LA German

FAN.CNT 1

PATENT NO.

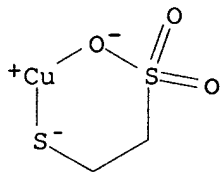
KIND

DATE

APPLICATION NO.

DATE

PI DD 269068 A3 19890621 DD 1987-301490 19870406
PRAI DD 1987-301490 19870406
OS MARPAT 112:167909
AB The bath contains a H₂SO₄-containing CuSO₄ electrolyte and a
S-containing organic H₂O-soluble additive. The additive, at a concentration
of 0.01-100
mg/L, permits a constant deposition of smooth or bright and ductile Cu
layers when used with inert anode materials and at c.d. ≤1000
A/dm².
IC ICM C25D003-38
CC 72-8 (Electrochemistry)
ST smooth copper layer electrodeposition bath
IT 126285-75-4 126397-51-1 126397-53-3 126397-54-4
126397-55-5
RL: PRP (Properties)
(electrodeposition of smooth copper layers from baths containing)
IT 7440-50-8, Copper, uses and miscellaneous
RL: USES (Uses)
(electrodeposition of smooth layers of, bath for)
IT 126285-75-4
RL: PRP (Properties)
(electrodeposition of smooth copper layers from baths containing)
RN 126285-75-4 HCAPLUS
CN Cuprate(1-), [2-mercaptoethanesulfonato(2-)-O1,S2]-, potassium (9CI) (CA
INDEX NAME)



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